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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/852,090	05/10/2001	Hirokazu Yamagata	12732-037001	5147

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EXAMINER

CLEVELAND, MICHAEL B

ART UNIT PAPER NUMBER

1762

DATE MAILED: 05/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/852,090

Applicant(s)

YAMAGATA ET AL.

Examiner

Michael Cleveland

Art Unit

1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 May 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 May 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4,5,7,8.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Interpretation

1. The term "the second luminous layer" in claims 7 and 12 does not have antecedent support in parent claim 1 and 2. Based on the specification and analogy to claims 3 and 4, the term "the second luminous layer" is interpreted as referring to the "second thin film" of parent claims 1 and 2.

The term "the luminous material" in claims 8 and 15 does not have antecedent support in parent claims 1 and 2. Based on the specification and analogy to claims 3 and 4, the term "the luminous material" is interpreted as referring to the "organic material" of parent claims 1 and 2.

The term "goggle type display" in claims 11 and 30-34 and is interpreted in light of the specification in accordance with p. 12 as referring to any head mounted display. The term "notebook type personal computer" is not defined in the specification but appears to include any portable personal computer. For purposes of applying art, the terms have been interpreted as described in this section.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of Kobori

Art Unit: 1762

'039 is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

3. Claims 1-4, 7-8, and 12-17 are rejected under 35 U.S.C. 102(e) as being anticipated by Shi et al. (U.S. Patent 6,130,001, hereafter '001).

Claims 1, 3: '001 teaches a method of manufacturing a light emitting device (col. 2, lines 3-6) by

forming a luminous layer (18) (col. 3, lines 33-35) made of an electron-transporting material (A) and a hole-transporting material (B). The electron-transporting material (A) may be tris(8-quinolinol) aluminum (col. 4, lines 15-33) (also known as Alq or Alq3), an organic luminous material (see specification, p. 2, lines 1-11). Layer (18) is deposited by controlling the relative evaporation rates of A and B (col. 4, lines 10-13). The layer may begin as a layer of 0 % A (i.e., pure B), and increase to 100% A (i.e., pure A) (col. 3, line 32-col. 4, line 6).

Thus, layer (18) is formed by

forming a first luminous layer comprising organic luminous material (A, Alq) and a dopant (B) (in steadily decreasing amounts) by evaporation, and

forming a second luminous layer of pure A (col. 4, lines 1-5). The relative evaporation rate to achieve 100% A must be zero. That is, the evaporation of dopant B must be stopped while continuing to evaporate A.

Claims 2 and 4: The above discussion relates to the deposition of anode (14, 16), luminous layer (18), and cathode (20, 22) (cols. 3-4). However, '001 also teaches that the order of deposition may be reversed (col. 3, lines 19-23). That is, the layers may be deposited in the order of cathode (22, 20), luminous layer (18), and anode (16, 14), and the luminous layer (18) begins as pure A and finishes as pure B.

Claims 7 and 13: In the anode-to-cathode deposition, the cathode (22) is deposited on the second luminous layer (col. 3, lines 12-19; Fig.), and the cathode may be metallic (col. 2, lines 59-67).

Claims 8 and 15-17: As discussed above, the luminous material (A) may be Alq3.

Claims 12 and 14: In the cathode-to-anode deposition, the anode (14) is formed on the luminous layer (18). The anode may be metal (col. 2, lines 23-25).

Art Unit: 1762

4. Claims 1, 3, 7-9, 13, 16, and 21 are rejected under 35 U.S.C. 102(e) as being anticipated by Kobori et al. (U.S. Patent 6,285,039, hereafter '039). Maricle et al. (U.S. Patent 3,654,525, hereafter '525) is cited as evidence.

Reference example 2 of '039 (col. 559) teaches forming a light-emitting device by forming a layer by co-evaporating Alq (an organic luminous material) and TPD005 and rubrene (dopants) as the light-emitting layer of an electroluminescent (EL) device (col. 559, lines 44-50) to a 40 nm thickness (i.e., forming a first thin film of 20 nm thickness of Alq3, TPD005, and rubrene by co-evaporation and then forming a second thin film of 20 nm thickness by continuing to evaporate Alq, TPD005, and rubrene).

Claims 7 and 13: '039 teaches that a metallic magnesium-silver (MgAg) layer is deposited on the Alq layer (col. 559, lines 55-59).

Claims 8 and 16: The organic luminous material is Alq.

Claims 9 and 21: Rubrene is a fluorescent organic material. See '525, col. 5, lines 40-45.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-9 and 12-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobori '039 in view of Peng (U.S. Patent 6,495,198, hereafter '198) and Shi '001. Ueda et al. (U.S. Patent 6,468,676, hereafter '676) and Maricle '525 are cited as evidence regarding claims 9 and 20-24.

Claims 1, 3, and 5: Reference example 2 of '039 (col. 559) teaches forming a light-emitting device by

forming a layer by co-evaporating Alq (an organic luminous material) and TPD005 and rubrene (dopants) as the light-emitting layer of an electroluminescent (EL) device (col. 559, lines 44-50)

forming a layer of Alq alone as an electron-transporting and light-emitting layer on top of the Alq/TPD005/rubrene layer (col. 559, lines 51-54).

'039 does not explicitly teach that the evaporation of the dopants is stopped *while continuing the flow of Alq* in the deposition of these two layers.

However, '198 teaches that the efficiency and physical properties of electroluminescent devices may be improved by blurring the heterojunction between adjacent layers (such as the light-emitting and electron-transport layer) of EL devices (col. 2, lines 1-5; col. 3, lines 13-28). '198 achieves the blurred heterojunctions by moving the substrate past a series of evaporation sources (See Fig. 3B and col. 3, line 32-col. 4, line 13), to produce graded areas between the layers (see Fig. 2B). Therefore, it does not teach stopping the evaporation of one material while continuing the evaporation of another.

However, Shi '001 teaches another method of blurring the heterojunction between layers (col. 3, lines 33-44), by controlling the relative rates of evaporation, as discussed above.

Taking the references as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have blurred the heterojunction between the Alq3/TPD005/rubrene layer and the Alq3 layer in the EL device of '039 because '198 teaches that blurred heterojunctions improve the efficiency and physical properties of EL devices. Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have performed this blurring by gradually decreasing and finally stopping the flow of TPD005 and rubrene while continuing the flow of Alq3 with a reasonable expectation of success because '001 teaches that blurred heterojunctions of EL devices may be achieved by controlling the relative flow rates of the materials in the layers.

Claims 2, 4, and 6: As discussed above, '001 teaches that the layers may be deposited from cathode to anode instead of anode to cathode (col. 3, lines 19-23). '039 mirrors this teaching (col. 33, lines 33-35). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have reversed the process described above:

Art Unit: 1762

depositing a cathode, then an electron-emitting layer of Alq₃, and gradually increasing (i.e., starting) the flow of dopants TPD005 and rubrene.

Claims 5 and 6: Alq is a green luminescent material (see '039, col. 2, lines 18-25 or current specification, p. 2, lines 1-11). The Alq/TPD005/rubrene layer appears to be a yellow layer ('039, col. 559, lines 60-62). However, '039 also teaches that colors of light ranging from blue to red are of interest (col. 1, lines 19-23, col. 2, lines 16-48) and that there are known dopants to produce red layers (col. 33, lines 36-47), including Alq₃ doped with red dyes, such as P-660 or DCM1 (col. 2, lines 23-25). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a red Alq/DCM1 or Alq/P-660 to have produced a red layer instead of a yellow layer because '039 teaches that red EL devices are of interest in the art and that Alq doped with DCM1 or P-660 is known to produce red layers.

Claims 7 and 13: '039 teaches that a metallic magnesium-silver (MgAg) layer is deposited on the Alq layer (col. 559, lines 55-59).

Claims 8 and 15-19: As discussed above the luminescent host material may be Alq.

Claim 9 and 20-24: Rubrene is a fluorescent organic material. (See '525, col. 5, lines 40-45.) Regarding claims 23 and 24, DCM1 is also an organic fluorescent material. (See '676, col. 34, lines 18-35).

Claims 12 and 14: During cathode-to-anode deposition, the anode is formed on the luminous layers. The anode may be metal ('001, col. 2, lines 23-25; see also '039, col. 33, lines 10-33).

7. Claims 10 and 25-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobori '039 in view of Peng '198 and Shi '001, as applied to claims 1-6, above, and further in view of Singh et al. (U.S. Patent 6,228,228, hereafter '228). Thompson et al. (U.S. Patent 6,413,656, hereafter '656) is cited as evidence.

'039, '198, and '001 are discussed above. They do not teach that the dopant in the red layer is phosphorescent.

However, '228 demonstrates that red light-emitting layers may be formed by doping Alq with PtOEP (col. 10, lines 26-33). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used PtOEP as a dopant to form a red EL

Art Unit: 1762

layer instead of DCM1 or P-660 as disclosed by '039 with a reasonable expectation of success and with the expectation of similar results because '228 demonstrates the art recognized suitability of Alq/PtOEP layers as red EL layers, and the selection of a known material based on its suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07. '656 teaches that PtOEP is phosphorescent (col. 4, lines 18-22).

8. Claims 11 and 30-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobori '039 in view of Peng '198 and Shi '001, as applied to claims 1-6, above, and further in view of Yamada et al. (U.S. Patent 6,215,462, hereafter '462).

'039, '198, and '001 are discussed above. They do not discuss some uses of the EL devices (e.g., '198 discusses screen displays and multimedia monitors (col. 1, lines 16-26)), but they do not specifically teach that the EL device is incorporated into a video camera, digital camera, goggle display, car navigation system, sound reproduction system, notebook PC, game apparatus, portable information terminal or image playback device.

'462 teaches that organic EL devices are useful as the displays in the image playback portions of cameras (col. 4, lines 46-60). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated the EL device of '039, '198 and '001 into an image playback device with a reasonable expectation of success because '462 teaches that organic EL devices may be used in image playback devices (i.e., a specific multimedia monitor).

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. So et al. (U.S. Patent 5,925,980) is cited of interest for a more detailed discussion of the physical and electrical advantages of blurred heterojunctions taught by Peng '198 and Shi '001. See Figs. 1, 3, and 4, and col. 2, line 60-col. 4, line 36.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Cleveland whose telephone number is (703) 308-2331. The examiner can normally be reached on 8-5:30 M-F, with alternate Mondays off.

Art Unit: 1762

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 306-3186 for regular communications and (703) 306-3186 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



Michael Cleveland
Patent Examiner
May 1, 2003